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(54) Abstract Title
Mains supply socket attached to a printed circuit board (PCB)

(57) A printed circuit board (PCB) 1 has a socket assembly 2 defined by a housing 3 with pin receiving holes 4 to accept a mains power supply plug. The housing 3 may be fixed to the PCB 1 by a screw fastener 9 and/or locating barbed lugs 11. The holes 4 can be covered by a shuttering mechanism 6. The socket assembly 2 has sprung contacts 7,8 to communicate with the pins of a mains plug. The contacts 7,8 can be attached to the PCB by pins 10 which pass through the PCB and are soldered in place; alternatively they can be screwed in position. The mains socket and plug format can be any format including those conforming to British Standard 1363.

FIG. 1.

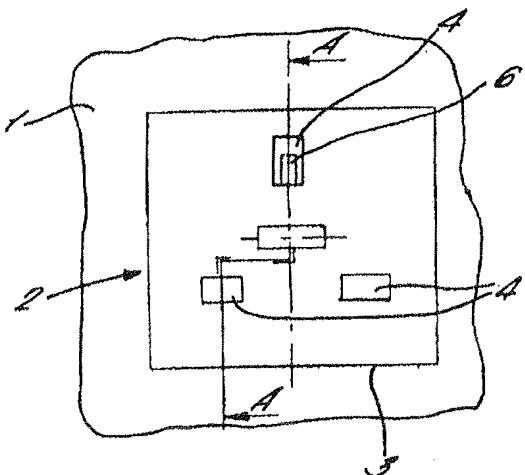
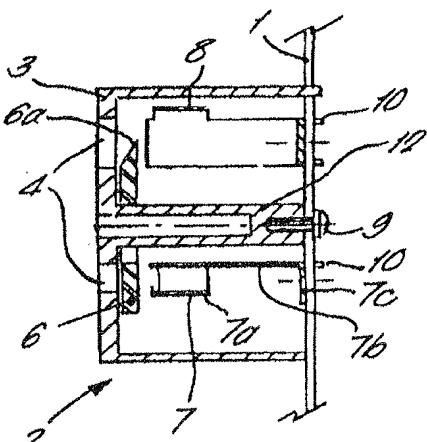


FIG. 3.



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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

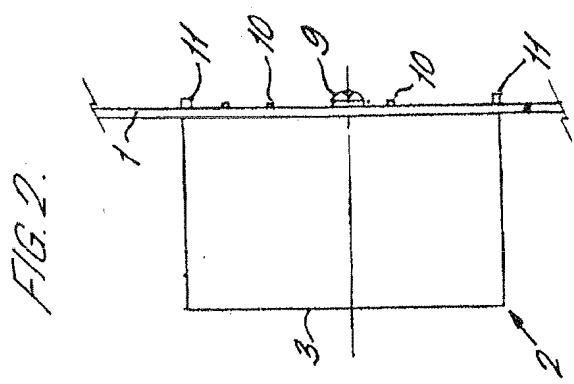
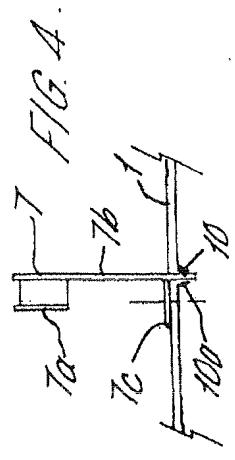
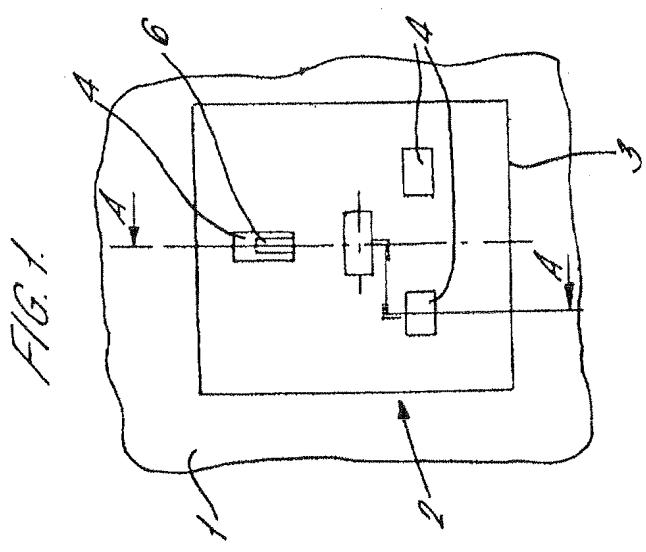
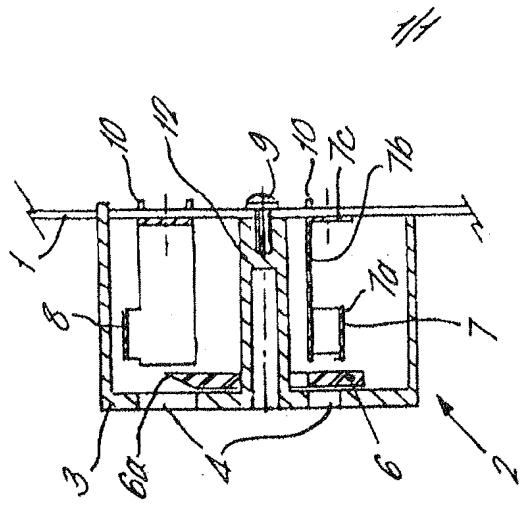


FIG. 3.



A Printed Circuit Board Mounted Socket

The invention relates to a socket which is mounted on a printed circuit board, being particularly
5 useful in electronic coin meters.

Printed circuit boards (commonly referred to as PCBs) are widely used in electronic devices. Printed circuit boards comprise an electronic circuit in which the wiring, commonly in the form of a copper coating,
10 is printed onto an insulating board. The wiring interconnects components on the board, such as microprocessors, memory chips. In order for printed circuit boards to operate it is necessary to supply electrical power to the circuit. A particular problem
15 is encountered where it is required to connect a mains electrical power supply to a printed circuit board. One such situation is described in the applicant's pending UK patent application GB 9804372.2 in which a coin operated metering device for use with television sets or other electrical devices comprises a printed circuit board which incorporates a mains socket for receipt of a standard electrical mains plug. The applicant has found that it is not possible to connect a mains socket to a printed circuit board without
20 extensive re-engineering of the socket and printed circuit board connections. US 4,838,404 discloses token and photo-detector circuitry in an electronic device used for supplying electrical power to an external appliance. A mains supply plug of the
25 external appliance is connected to the electronic device. However, the mains supply plug is not directly mounted to a printed circuit board within the electronic device leading to a need for significant re-engineering of the socket and printed circuit board
30 connections.
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Accordingly the present invention provides a printed circuit board having directly mounted thereto one or more contacts for receiving in use one or more pins of a mains supply plug.

5 In a particular embodiment the printed circuit board additionally comprises a housing directly mounted to the printed circuit board and surrounding the one or more contacts.

10 Preferably the one or more contacts are soldered to the printed circuit board.

Alternatively the one or more contacts are mounted on the printed circuit board by mechanical fastening means.

15 Preferably the one or more contacts comprise one or more pins which, when the contacts are assembled to the printed circuit board, extend through holes in the printed circuit board to protrude from a rear face thereof, the solder being applied between the rear face of the printed circuit board and the one or more pins.

20 Preferably the housing is releasably fastened to the printed circuit board by means of a screw fastener.

25 In one embodiment the three contacts are suitably located for receiving a British Standard 1363 plug.

An advantage of the apparatus of the present invention is that a simple means is provided for mounting a mains electrical socket on a printed circuit board, with a consequential saving in both 30 manufacturing time and cost.

The present invention will now be described, by way of example only, with reference to the accompanying drawings, in which:

35 Figure 1 is a front view of a printed circuit

board mounted socket according to the present invention;

Figure 2 is a side view of the socket of Figure 1;

5 Figure 3 is a cross-section side elevation of the socket of Figure 1 taken along line A-A; and

Figure 4 is a detailed cross-sectional elevation of one of the spring contacts of the socket of Figure 1.

10

Referring to Figure 1 there is depicted a socket 2 mounted on a printed circuit board 1. The printed circuit board 1 is conventional and, for the purposes of the present invention, may be of any type. The 15 socket 2 shown in Figure 1 has a configuration conforming to British Standard 1363.

The socket 2 comprises a generally box shaped housing 3 of plastics material or similar in a front face of which are provided three apertures 4 for receiving in use pins of a mains supply plug (not shown). The three apertures 4 are spaced apart with one of the apertures 4 located vertically above the other two. The spacing and orientation of the apertures 4 is determined by the positioning of the 25 pins of the mains supply plug to be used with the socket 2.

The apertures 4 may be provided with a shuttering mechanism 6 for safety reasons. When the uppermost pin of the mains supply plug (which in a BS1363 plug is the longest) is inserted into the uppermost aperture 4 it contacts angled surface 6a of the shuttering mechanism 6 causing the shuttering mechanism 6 to move downwards and out of alignment with the lowermost apertures 4 to allow entry of the 30 lowermost, shorter, pins of the mains supply plug into

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their respective apertures.

The socket 2 is also provided with three sprung contacts 7, 8. Each of the pins of the mains supply plug is slidably received in a sprung contact 7, 8 on insertion of the pins into the socket 2. The uppermost sprung contact 8 is identical to the lowermost sprung contacts 7 except that the orientation of the contact is rotated by 90 degrees to match the orientation of the uppermost pin of a BS1363 mains supply plug. As such, only the lowermost sprung contacts 7 will be further described in detail.

The sprung contacts 7 comprise an arm 7b having at one end a foot 7c and at the other end a channel section 7a. The channel section 7a is sized to receive a pin of the mains supply plug as a tight, sliding fit such that the channel section 7a provides some resistance to removal of the pin from the sprung contact 7. The relatively flexible arm 7b allows the channel section 7a to move slightly to accommodate vertical and horizontal movements of the pin as it is inserted and withdrawn.

Whilst the socket shown in the accompanying drawings conforms to BS1363 the present invention is not limited to any particular design of plug or pin layout and may comprise a socket suitable for use with mains supply plugs commonly used in other countries, for example, continental-style two-pin plugs.

According to the present invention the socket 2 is mounted directly onto the printed circuit board 1 such that the board 1 provides the rear face of the housing 3. In the embodiment of the invention described and shown in the accompanying drawings the socket 2 is mounted to the printed circuit board by means of a screw fastener 9. The screw 9 passes through a hole formed in the printed circuit board 1

into engagement with a threaded hole formed in a central internal extension 12 of the housing 3.

The socket housing 3 may also be provided with locating lugs 11 designed to fit in holes in the 5 printed circuit board 1 in order to more firmly locate the housing 3 to the board 1. Optionally, the lugs 11 may be provided with a barbed profile to prevent detachment of the housing 3 from the printed circuit board 1 after assembly.

10 In a preferred embodiment the sprung contacts 7, 8 are directly mounted onto conductive portions of the printed circuit board 1 by means of pins 10 which are inserted into holes formed in the printed circuit board 1. The pins 10 are of a length to protrude from 15 the rear face of the printed circuit board 1 by a sufficient extent to allow for securing of the pins 10 to the board 1 by a soldered joint 10a. Preferably each sprung contact 7, 8 is fixed to the printed circuit board 1 by at least two pins 10. Preferably 20 the pins 10 are formed as an extension of the arm 7b of each sprung contact 7, 8. Alternatively the sprung contacts 7, 8 may be mounted to the printed circuit board 1 by screws or other mechanical fastening means.

The foot 7c of the sprung contacts 7, 8 provides 25 a greater basal area at the join between the sprung contacts 7, 8 and the printed circuit board 1 to increase the stability of the sprung contacts 7, 8.

An advantage of the present invention is that the 30 sprung contacts 7, 8 may be fixed to the printed circuit board 1 prior to assembly of the remainder of the socket housing 3. In addition the fixing of the sprung contacts 7, 8 by soldering may easily be automated and optionally undertaken at the same time as soldering of other components to the printed 35 circuit board. These advantages reduce the

manufacturing time and cost of the apparatus.

Claims

1. A printed circuit board having directly mounted thereto one or more contacts for receiving in use one or more pins of a mains supply plug.
5
2. A printed circuit board as claimed in claim 1 additionally comprising a housing directly mounted to the printed circuit board and surrounding the one or
10 more contacts.
3. A printed circuit board as claimed in claim 1 or claim 2 wherein the one or more contacts are mounted on the printed circuit board by mechanical fastening
15 means.
4. A printed circuit board as claimed in claim 1 or claim 2 wherein the one or more contacts are soldered to the printed circuit board.
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5. A printed circuit board as claimed in claim 4 wherein the one or more contacts comprise one or more pins which, when the contacts are assembled to the printed circuit board, extend through holes in the printed circuit board to protrude from a rear face thereof, the solder being applied between the rear face of the printed circuit board and the one or more pins.
25
6. A printed circuit board as claimed in any of claims 2 to 5 wherein the housing is releasably fastened to the printed circuit board by means of a screw fastener.
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7. A printed circuit board as claimed in any
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preceding claim comprising three contacts suitably located for receiving a British Standard 1363 plug.

8. A printed circuit board substantially as hereinbefore described with reference to and as shown in the accompanying drawings.



Application No: GB 9920771.4
Claims searched: 1-8

Examiner: Brendan Churchill
Date of search: 23 February 2000

Patents Act 1977
Amended Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed. R): H2E (ECAGX, ECAJX, ECSB, ECSX, EEKE, EEKH)

Int Cl (Ed.7): H01R

Other: Online: EPODOC, JAPIO, WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB 2295280 A (Legrand Electric Limited) Particularly fig 6 with circuit board 1 and contact members 220 and 330	1-7
X	GB 2159345 A (Weidmuller) Page 2 lines 34-57	1-7
X	DE 3004401 (Telefonbau & Normalzeit) WPI abstract	1,3-5,7
X	JP 08-124468 (Fuji Electric) Socket 3 with terminals 5	1-7
X	STC Electronic Services, 1988 "The Electronics Book", p361 AMP Universal Mate-N-Lok	1,3-5,7

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	B	Patent document published on or after, but with priority date earlier than, the filing date of this application.